8. Introduction

Physical characteristics and natural resources have played an important role in the development of Augusta and Richmond County. Crops and timber have been produced from local soils for many years. Fine kaolin and the raw materials for brick, tile and concrete products are mined in the county. Water supplies from both deep wells and surface sources have contributed to farming, domestic use, and commerce. The land and water also combine to support a variety of plant and animal life.

As urban land use continues to spread throughout the city, interest is growing in striking a balance between protecting natural resources and accommodating new urban development. This chapter includes an inventory and assessment of local natural resources and outlines the steps being taken to protect them. These resources include floodplains, soils, aquifers, water recharge areas, watersheds, wetlands, prime agricultural and forestlands, and scenic views and sites. Historic and archaeological resources are addressed in a separate chapter. Included is an overview of the programs, policies, and development regulations used to manage these natural resources in accordance with the desires of the public and to implement the Comprehensive Plan.

8.1 Richmond County's Natural Environment

Richmond County is located in east central Georgia next to the Savannah River. The Savannah River separates Georgia from the neighboring state of South Carolina. Adjoining counties include Columbia and McDuffie to the north and west and Burke and Jefferson to the south. Richmond County occupies a land area of 207,386 acres, or 324.04 square miles, plus 2,823 acres (4.41 sq. mi.) of water area. Table N-1 shows that Augusta accounts for approximately 93% of the total acreage in the county. Richmond County straddles the "Fall Line", a geologic boundary following the Appalachian Mountain range from Alabama to New York. In Georgia and South Carolina the Fall Line separates the Piedmont from the Coastal Plain. The Savannah River and its tributaries drain most of the county.

8.1.1 Climate

Richmond County has a relatively mild climate characterized by long hot summers and short cool winters. Prevailing winds are from the southeast and southwest, bringing in moist tropical air from the Atlantic Ocean and the Gulf of Mexico. In summer the average temperature is 79 degrees, and the average daily high exceeds 90 degrees F in June, July and August. In winter the average temperature is 47 degrees F, and the average daily minimum temperature is 35 degrees. Total annual precipitation is 46 inches, with 23 inches falling in April through September. Annual precipitation amounts have been below normal for the last 45 years. The average relative humidity in mid afternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 90 percent.

Table N-1
Land and Water Area, 2000
Richmond County, GA

	Area in Square Miles			Persons per Square Mile
	Land	**Water**	**Total**	
Richmond County	324.04	4.41	328.45	616.5
Augusta	302.13	4.35	306.48	646.0
Hephzibah	19.36	0.06	19.42	200.4
Blythe	2.54	0.06	2.55	280.4

SOURCE: U.S. Bureau of the Census, Census 2000 Summary File 1

8.1.2 Topography

Richmond County is situated in three major land resource areas: the Southern Piedmont, the Carolina and Georgia Sand Hills, and the Southern Coastal Plain. The Southern Piedmont covers the extreme northern part of the county and consists of broad to narrow ridgetops and long irregular hillsides bisected by numerous small winding drainageways. The Carolina and Georgia Sand Hills are located in the northern and western parts of the county and separate the Southern Piedmont from the Southern Coastal Plain. The Southern Coastal Plain covers the southern and southeastern parts of the county and is characterized by broad ridgetops and hillsides extending to drainageways. Nearly level floodplains of the Savannah River are located in the eastern and northern parts of the county and on the narrower basins of its tributaries.

Elevations range between 100 and 140 feet along the Savannah River and 500 feet or more on high ridges on Fort Gordon. More than half of the total land area has a slope of less than 5%, and more than 85% of the land has less than 10% slope. Less than 2% of the land area has slope greater than 15%. The steepest slopes are found along Butler, Spirit and Little Spirit Creeks. The majority of areas with steep slopes are either within floodplains, which are regulated by local ordinance, or are located on Fort Gordon

8.1.3 Soils

Soils in Richmond County are grouped into eight (8) associations. A soil association is a landscape that has a distinctive proportional pattern of soils. A soil association usually consists of one or more major soils, for which it is named, and at least one minor soil. Soils in one association may also occur in another, but in a different pattern.

Soils on ridgetops and hillsides of the Southern Piedmont: well-drained soils on very gently sloping and sloping ridgetops and hillsides. Slopes range from 2 to 15 percent. The soils have a loamy surface layer and predominantly firm clayey or loamy subsoil.

- Georgville-Wedowee - Very gently sloping to sloping, well drained soils that have a loamy surface layer and predominantly firm clayey or loamy subsoil. Moderate permeability limits the use of these soils for septic tanks absorption fields. These soils account for 3 percent of all soils and are found in the northeastern part of the county. The areas are a combination of woods, residential subdivisions, shopping centers and industry.

Soils on ridgetops and hillsides of the Sand Hills: well-drained and excessively drained soils on very gently sloping and gently sloping ridgetops and hillsides. Slopes range from 1 to 10 percent. The soils have a thick sandy surface layer and friable loamy subsoil and others that are sandy throughout.

- Troup -Lakeland - Very gently sloping and gently sloping, well drained soils that have a thick sandy surface layer and friable loamy subsoil and excessively drained soils that are loose and sandy throughout. These soils are well suited to most urban uses. These soils account for 27 percent of all soils and are scattered throughout the central and southern parts of the county. The areas are a combination of urban land uses and woodlands.

- Troup - Vaucluse - Ailey - Very gently sloping and gently sloping, well drained soils that have a predominantly sandy surface layer and friable or mostly firm and brittle loamy subsoil. These soils are well suited to most urban uses. These soils account for 17 percent of all soils and are scattered throughout the northern part of the county. The areas are a combination of urban land uses and woodlands.

Soils on ridgetops and hillsides of the Southern Coast Plain: well-drained soils on nearly level to gently sloping ridgetops and hillsides. Slopes range from 0 to 8 percent. The soils have a predominantly sandy surface layer and friable loamy subsoil.

- Orangeburg-Lucy-Dothan - Nearly level to gently sloping, well drained soils that have a predominantly sandy surface layer and friable loamy subsoil. These soils account for about 13 percent of all soils and are found in the south central part of the county. Areas are used mainly for farming and woodlands.

Soils on hillsides of the Sand Hills and Southern Coastal Plain: well-drained soils on strongly sloping and moderately steep hillsides. Slopes range from 8 to 17 percent. The soils have a sandy surface layer and friable or mostly firm and brittle loamy subsoil.

- Troup-Vaucluse-Ailey - Strongly sloping and moderately steep, well drained soils that have a sandy surface layer and friable or most firm and brittle subsoil. These soils are poorly suited for farming and only moderately suited for wood crops and

must urban uses. These soils account for about 14 percent of all soils and are located across the southern part of the county.

Soils on/near Floodplains: poorly drained soils that are nearly level. Soils have a loamy surface layer and friable loamy or firm clayey subsoil.

- Riverview-Chewacla-Chastain - Nearly level, well drained and somewhat poorly drained soils that are friable throughout and poorly drained soils that have a loamy surface layer and firm clayey subsoil. These soils are located in the floodplains of the Savannah River in the eastern part of the county. They comprise about 11 percent of the county. Primarily wooded, this association does have areas that are used for cultivated crops or pasture. There is considerable industrial and residential development in areas protected by the Savannah River levee. Clay has been mined for the manufacture of bricks, and the excavated areas are filled with water.

- Bibb-Osier - Nearly level, poorly drained, predominantly loamy soils that are friable and sandy soils that are loose. These soils are located on floodplains of the major tributaries of the Savannah River and account for 9 percent of all soils. Major tributaries include the following creeks: Rae's, Rocky, Butler, Spirit, Little Spirit and McBean. Primarily wooded, this association is poorly suited for farming and urban uses.

- Dogue-Goldsboro-Roanoke - Nearly level, moderately well drained and poorly drained soils that have a loamy surface layer and friable loamy or firm clayey subsoil. These soils are located on stream terraces and low-lying uplands adjacent to flood plains. They comprise about 6 percent of all soils and are found primarily in the northeastern part of the county. This association includes a mix of urban development, industry, wooded areas, and swampland.

8.1.4 Agricultural and Forest Land

The Georgia County Guide classified 14,775 acres as non-forestry farmland in 1997 or 7.1 % of the land in Richmond County. In 1997 there were 106 farms in the county. The average farm size was 139 acres and the median size was 50 acres. Crops include corn, soybeans and peanuts. Commodities include forestry, dairy, beef cows and ornamental horticulture. The county ranked 94th within the state for acres of harvested cropland. The 7,189 acres in harvested cropland is up 15.9% from the 5,565 acres reported in 1992.

Currently, 121,200 acres in Richmond County are forested, or 58.4% of the entire county. Of this total 56,000 acres are owned by private individuals, 39,000 acres by the Federal government (Fort Gordon), and 17,000 acres by the forest industry. The breakdown of major forest groups is Loblolly-short leaf pine - 32,800 acres, Long-leaf slash pine - 26,100 acres, and Oak-pine - 24,200 acres. Much of the forested land is undeveloped at the present time. Outside of Fort Gordon, forestlands in the county are subject to more intense development. The forestland on Fort Gordon is less likely to be converted to other uses.

As Richmond County continues to grow, the remaining farmland and forestland will come under more development pressure. A number of local development regulations help to minimize the impact of proposed land use changes. These include zoning restrictions on allowable densities, landscaping requirements for commercial development, and soil erosion and sediment control requirements. Augusta-Richmond County also has in place regulations for the protection of wetlands, groundwater recharge areas, water supply watersheds, and the Savannah River corridor. These regulations were adopted in October 1998 in compliance with the Georgia Department of Natural Resources, Rules for Environmental Planning Criteria.

8.1.5 Plant and Animal Habitat

Richmond County is home to several plants and one animal (an invertebrate) classified as endangered, threatened, unusual or rare. Four of the plants are listed as "candidates" for federal protection under the Endangered Species Act of 1973. One plant, the Sweet Pitcherplant, has "partial status", meaning that the plant is federally protected in only a portion of the species' range. All projects that require a direct federal approval, permit, grant, loan or loan guarantee must comply with provisions of the Endangered Species Act. This includes consulting with the Department of the Interior to avoid adverse impacts on endangered species.

Table N-2
State and Federally Protected Plants and Animals
Richmond County, GA

Plants:	**Federal Status**	**State Status**
• Georgia Aster	Candidate	None
• Atlantic White-cedar	None	Rare
• Pink Ladyslipper	None	Unusual
• Shoals Spiderlily	Candidate	Endangered
• Indian Olive	None	Threatened
• Sweet Pitcherplant	Partial Status	Endangered
• Ocmulgee Skullcap	Candidate	Threatened
• Silky Camellia	None	Rare
• Pickering Morning-glory	Candidate	Threatened
Animals:		
• Pigtoe Mussel	None	Endangered

Source: Georgia Department of Natural Resources, Protected Species List, DNR Website, May 6, 2003

Some plants are protected solely under provisions of the Georgia Wildflower Preservation Act of 1973. The act authorizes rules for the collection, transport, sale and listing of protected plants. The Georgia Environmental Policy Act (GEPA) requires that impacts to protected species be addressed for all projects on state-owned lands and for all municipal or county projects if funded half or more by state funds, or by a state grant of more than $250,000.

8.2 Major Parks, Recreation and Conservation Areas

Richmond County has several conservation, recreation and natural areas. Following is a brief description of the major natural attractions within the county. Additional information can be found in the Historic Resources and Community Facilities chapters.

8.2.1 Savannah River

The Savannah River is an exceptional resource that has had a tremendous impact on the history and development of the community. The stretch of the river adjacent to Augusta and Richmond County is one of the more unique parts of the waterway. It is just upstream from the city where the river rolls over the fall line separating the Piedmont and Coastal Plain physiographic provinces. The shallow waters at the fall line served as a river crossing for centuries, and have characteristics that are in sharp contrast to the deeper, navigable reaches downstream. This change in the river's environment allows it to support a variety of plants, animals, and wildlife, and gives residents a greater appreciation of the natural environment. Over the years, a number of archaeological sites have been identified in the area, many of which are located in the floodplains and swamps near the river corridor.

8.2.2 Augusta Canal

The Augusta Canal is a man-made resource located next to the Savannah River in Richmond and Columbia Counties. Owned by the city of Augusta, and managed by the Augusta Canal Authority, the canal is a designated National Historic Landmark (1977), a Regionally Important Resource (Georgia-1994), and a National Heritage Area (U. S. Congress-1996). National Heritage Area designation recognizes the canal as a treasure of national significance, spotlights Augusta on national tourist maps, and makes technical assistance and resources available through the National Park Service.

Constructed in 1845, and enlarged in 1876, the Augusta Canal is among the nation's best examples of a 19th century industrial canal system. When first built the canal's three main functions were to provide water power for industry, waterborne transportation for commodities (e.g. cotton), and a source of water for

the community. Today, the canal continues to provide water power to two textile mills and powers the pumps at the city's raw water pumping station. The canal provides residents and visitors with a variety of recreational opportunities, including hiking, boating, bicycling and fishing. There are scenic views of the Savannah River and several historic structures adjoining the canal. For several years the Augusta Canal Authority has been implementing projects contained in the Augusta Canal Master Plan. This includes projects to renovate many of the historic structures associated within the canal, improve and expand the canal towpath, improve access to the canal, and make the canal a tourist destination.

8.2.3 Phinizy Swamp Wildlife Management Area

This 1,500-acre, state-owned cypress wetland is located in east Augusta approximately two miles south of downtown. The wildlife management area is owned by the Georgia Department of Transportation (GDOT) and managed by the Georgia Department of Natural Resources. It was created as a result of a compromise brokered with environmental agencies to allow construction of Bobby Jones Expressway through the swamp. GDOT agreed to purchase and preserve the acreage in exchange for approval of the road project by the U. S. Fish and Wildlife Service and the U. S. Environmental Protection Agency. The expressway extension, which opened in the summer of 1998, bisects the wildlife management area.

The Merry Brickyard ponds border the wildlife management area on one side and the 1,100-acre Phinizy Swamp Nature Park on another. It is home to over 100 species of waterfowl, and a variety of wildlife that includes deer, alligators, bald eagles, bobcat, beaver, snakes, and panthers. Permitted public use activities include hunting (archery only), fishing, hiking, and birdwatching. Access points are located off of Gravel Pit Road and from a half-mile long gravel road behind the Messerly Wastewater Treatment Plant.

8.2.4 Phinizy Swamp Nature Park

This 1,100-acre nature park is located south of the Phinizy Swamp Wildlife Management Area and adjacent to the Messerly Wastewater Treatment Plant. The Nature Park is owned by the city of Augusta and managed by the Southeastern Natural Sciences Academy - a nonprofit educational organization. Like the wildlife management area, the Swamp Park is home to a variety of plant and animal life coexisting in an ancient wetland area. The mission of the Southeastern Natural Sciences Academy is to promote environmental stewardship through education, research, land conservation and public outreach. The Academy has established partnerships with area school systems and has booked 8,000 students for its on-site education programs during the 2002-03 school year. Field trip demand has risen steadily since programs began in 1998.

The Academy offers classes, tours and workshops at the Nature Park. A typical monthly calendar of events includes a tour of the park, a family bike tour, a "waterfowl" walk, and a clean-up day. The park offers endless opportunities for learning, volunteering, and working with others to promote environmental stewardship.

Included within the park is an innovative sewage treatment system where semi-treated wastewater from the Messerly Wastewater Treatment Plant flows into a series on man-made wetland cells. There microbes and bacteria break down harmful waste products and the cleansed water then flows back into Butler Creek on its way to the Savannah River. The constructed wetlands clean municipal wastewater, provide habitat for plants and wildlife, and serve as a learning environment for park visitors. The Academy has plans for improvements at the Nature Park including construction of a research facility, visitor's center, and extension of the Floodplain Boardwalk. The Academy is also finalizing an agreement with GDOT and GA DNR to incorporate part of the Phinizy Swamp WMA into its education programs.

8.2.5 Merry Brickyard Ponds

Merry Brickyard Ponds is a semi-public fishing area located immediately north of the Phinizy Swamp Wildlife Management Area. The ponds are actually a series of strip mines that nature has transformed into a nationally known waterfowl habitat. The ponds lie among 3,100 acres owned by Merry Land Properties, Inc., which still has active clay mining leases on parts of the site.

Plans are underway to transform much of the area into new uses that will include a wetland mitigation bank. A wetlands mitigation bank offers credits to developers whose projects disrupt sensitive natural areas elsewhere. A developer can "buy" land in a mitigation bank to offset losses of wetlands elsewhere. The result is the preservation and restoration of large habitats such as the Brickyard Ponds. What the owners envision is the gradual transition of the ponds from a fishing resource to more of a conservation resource. While there will be fishing for many years to come, some ponds will be drained, filled and planted with trees to foster more diversity in the ecosystem.

8.2.6 Spirit Creek Education Forest

Spirit Creek Education Forest is 570 acres of wetlands, planted loblolly pine and bottomland hardwoods located in the midst of urban development in south Richmond County. The Georgia Forestry Commission owns and maintains the property. The Forestry Commission offers a number of educational programs and activities on-site including the following:

- A self-guided interpretive trail through a tupelo swamp on a handicapped-accessible boardwalk
- An arboretum displaying native trees and ecosystems of Georgia
- Interpretive nature trails
- Fields displaying three different stages of a sandhill natural succession and the wildlife inhabiting the sites
- Soil investigation studies and wetland habitat and quality studies
- Experimental wooden bridge
- Timber management practices of thinning, harvesting and regeneration
- A prescribed burning demonstration
- Wildlife management
- Agricultural crop terracing practices

8.3 Air Quality

Air quality is an issue in communities throughout the country, including Augusta. Air pollution has a direct impact on public health and well being. It also has implications for economic development, transportation, and the quality of life in communities.

Ozone, the main ingredient of smog, is a serious air quality problem. Even at low levels ozone can have a number of effects on the respiratory system. Ozone is a gas that occurs both in the Earth's upper atmosphere and at ground level. Ozone can be good or bad, depending on where it is found. Ozone occurs naturally in the Earth's upper atmosphere - 10 to 30 miles above the Earth's surface - where it shields us from the sun's harmful ultraviolet rays.

In the Earth's lower atmosphere, near ground level, ozone is formed when pollutants emitted by cars, power plants, chemical plants, and other sources react chemically in the presence of sunlight. Ozone pollution is a concern during the summer months when the weather conditions needed to form ground-level ozone - lots of sun and hot temperatures - normally occur.

Particulate matter (PM) is another type of air pollutant. Particulate matter is any material that exists as solid or liquid in the atmosphere. Particulate matter may be in the form of fly ash, soot, dust, fog, fumes or other materials. Particulate matter causes irritation and damage to the respiratory system. This can result in difficulty breathing, induce bronchitis and aggravate existing respiratory disease. Exposure to particulates impacts individuals with chronic pulmonary or cardiovascular disease, people with influenza or asthma, children and elderly persons.

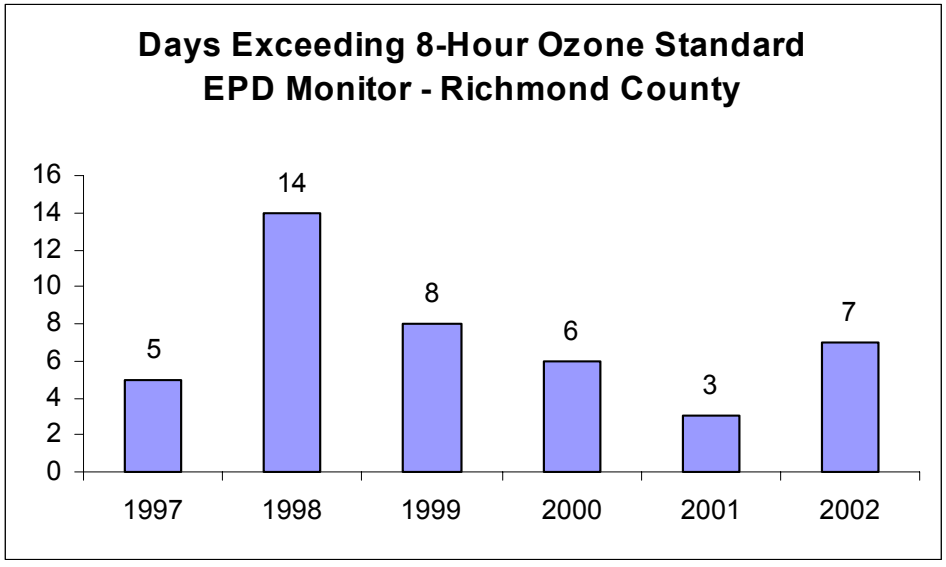
Local officials have taken proactive steps to deal with air pollution. In 1999 the Augusta Air Quality Task Force (AQTF) was formed under the auspices of the Metro Augusta Chamber of Commerce. The mission of the AQTF is to advise the Georgia Environmental Protection Division (EPD) on local compliance with the Clean Air Act.

The task force is comprised of business leaders, transportation planners, real estate developers, environmentalists, and government officials.

In the fall of 1999, the AQTF joined forces with similar groups in Macon and Columbus to pursue completion of a detailed study of air quality in the three "Fall Line" cities. As a result of their efforts, and with funding from the state of Georgia, the Fall Line Air Quality Study (FAQS) started in 2000. The Georgia Tech Center for Urban and Regional Ecology is directing the study. FAQS consists of four primary components: 1) enhanced monitoring of air pollution, 2) development of an emissions inventory, 3) modeling of air quality, and 4) analysis, assessment, and recommendations.

Data indicate that the Augusta area has an ozone problem. The EPD has had a permanent ozone monitoring station in Augusta since 1989. The station is located at Bayvale Elementary School in south Augusta. In recent years, ozone levels recorded at the station have exceeded allowable standards on several occasions. Under the Federal Clean Air Act Amendments, violations occur when 8-hour ozone averages exceed 0.085 parts per million. Data recorded by EPD at a monitoring station located at Bayvale Elementary School indicate that ozone levels in Augusta have exceeded the 8-hour standard, on varying numbers of days, for several years (see chart below).

As part of the FAQS, a second monitoring station was established in the Augusta area. This station is located near Riverside Elementary School in Columbia County. Air quality data collected at this location confirmed the ozone levels recorded at the EPD site. The data from FAQS monitoring sites across the state also indicate that Augusta's air quality problems are a product of regional factors, meaning that there is little individual communities can do to resolve pollution on their own. EPD officials believe that most solutions to air quality problems in Augusta will come from planned control measures at the state and federal levels.



Communities whose three-year averages for ozone exceed the national 8-hour standard of 0.085 ppm are to be designated as non-attainment areas. Based on the monitoring data, it appears likely that Augusta will be designated an ozone non-attainment area by the U. S. Environmental Protection agency in the spring of 2004. Augusta may also be designated non-attainment for fine particulate Matter (PM 2.5). Monitoring data for the years 2000 – 2002 indicates that the amount of PM 2.5 is slightly above the standard of 15 micrograms per cubic meter.

Non-attainment designation has implications for economic development and transportation in the city. Under non-attainment, new or expanding industry that generates emissions would be subject to EPA's New Source Review program. The program requires that new plants and major modifications of existing plants obtain a permit before construction, which will be issued only if the new plant or major modification includes pollution control measures that reflect the best technology available.

Under the Clean Air Act, Metropolitan Planning Organizations (MPOs) in non-attainment areas must demonstrate through the transportation conformity process that planned transportation investments, strategies and programs, taken as a whole, have air quality impacts consistent with the Georgia State Implementation Plan (SIP), and that emissions do not exceed the SIP targets for emissions from mobile sources. Transportation conformity is essentially a way to ensure that Federal funding and approval are given to those transportation activities that are consistent with air quality goals. If the Augusta area's transportation plan, program, or an individual project does not meet conformity, transportation officials have the following options:

- Modify the plan, program, or project to offset the expected emissions
- Work with the Georgia EPD to modify the SIP to offset the plan, program, or project emissions

Should the modifications not be achieved, and if a conformity determination cannot be made within certain time frames after amending the SIP, conformity lapses and no new transportation projects may advance until a new conformity determination can be made. During a conformity lapse, FHWA and FTA can only make approvals on grants for projects that are exempt from the conformity process, such as safety projects, and transportation control measures included in an approved SIP.

As the FAQS continued, local and state officials took additional steps to prepare for non-attainment designation. Between September 2000 and June 2001, The Augusta MPO sponsored three Interagency Consultation meetings. Interagency consultation is an integral part of the transportation conformity process designed to ensure that state and local agencies work cooperatively to resolve air quality and related transportation issues. The IAC meetings provided an opportunity for all the stakeholders to get acquainted and to discuss relevant issues. IAC meetings were suspended when it became apparent that non-attainment designations were going to be delayed. It is anticipated that IAC meetings will resume after non-attainment designations are official.

In March, 2001, the Augusta MPO 's Policy Committee endorsed a resolution authorizing the MPO to enter into a memorandum of agreement with certain federal agencies and the South Carolina Department of Transportation regarding interagency consultation procedures in South Carolina. Part of Aiken County is within the Augusta MPO's study area. The memorandum of agreement spells out the criteria and procedures for the determination of the conformity of transportation plans, programs and projects in South Carolina areas designated as non-attainment or maintenance for national air quality standards. By the spring of 2002, the memorandum of agreement was signed by Augusta MPO representatives, the other MPOs in South Carolina, and the relevant state and federal agencies.

In December 2002, the city of Augusta entered into an Early Action Compact (EAC) with Georgia EPD and U. S. EPA. The EAC is a Memorandum of Agreement for the express purpose of developing and implementing an Early Action Plan (EAP) that will reduce ozone levels in the Augusta area to maintain compliance with the 8-hour ozone standard. The EAC represents a proactive effort to meet air quality standards sooner than required (by December 31, 2007) under the 8-hour ozone implementation rule. Among the potential benefits of participation in the EAC are the following:

- A positive impact on public health and the environment.
- Public health benefits will be realized by meeting the more stringent 8-hour ozone standard sooner than required.
- Partnerships working together to implement local control strategies to maintain clean air and provide public health protection.
- Positive public reaction for voluntarily addressing air pollution problems ahead of federal requirements.
- Deferral of effective date of non-attainment designation thereby deferring costly and potentially unnecessary requirements associated with non-attainment. This includes deferral of New Source Review and Transportation Conformity requirements.

Since signing the EAC, the city has worked with other stakeholders to evaluate possible emission reduction control strategies and to develop a public involvement strategy that will become part of Augusta’s Early Action Plan. On July 18, 2003, the Georgia Department of Natural Resources recommended to the U.S. EPA that Richmond County be designated an 8-hour ozone nonattainment area. EPA will make the final decision on the nonattainment designation in April 2004.

8.4 Water Resources

Water resources are a defining characteristic of Richmond County and vital to the community's future. The Savannah River is the most visible surface water resource. The Savannah and its tributaries drain much of the county. Three creeks located in the Southern Piedmont area of the county - Rock, Rae's, and Crane - drain the northwest part of the county. Rocky, Butler, Spirit and Little Spirit Creeks drain the Sand Hills

province, consisting of a series of valleys and broad, level ridges. The remaining creeks - Sandy Run, New Hope Branch and Rebecca Walker Creek, drain to McBean Creek on the Burke County line. The Savannah River floodplain extends along the entire northeastern side of the county and covers approximately 63 square miles. The river floodplain is relatively flat and includes areas that are continuously wet and swampy (e.g. Phinizy Swamp) and areas that are subject to periodic flooding.

Groundwater resources in Richmond County are found in two major aquifers: the Upper Cretaceous and Basal Cretaceous aquifers. The Upper Cretaceous aquifer, the shallower of the two reservoirs, is not extensively developed. Most of the groundwater used in the county is pumped from the Basal Cretaceous aquifer. The Georgia Department of Natural Resources classifies the Cretaceous aquifer as a significant groundwater recharge area.

In recent years, the city of Augusta has taken several steps to protect its water resources. These steps include:

- Adoption of ordinances and regulations to protect aquifers and groundwater recharge areas, water supply watersheds, and the Savannah River Corridor. These ordinances enacted in accordance with environmental standards established by the Georgia Department of Natural Resources.
- Amendments to the Flood Damage Prevention Ordinance to increase restrictions on developing within the 100-year floodplain of streams and rivers.
- Completed the Augusta Watershed Assessment. This two-year project identified areas where surface water is affected by pollution and developed strategies for protecting and improving water quality.
- Completed the Augusta-Central Savannah River Basin Source Water Assessment. This two-year project evaluated the susceptibility of public water systems in the river basin to draw water contaminated by identified sources at concentrations that would pose a health concern. In addition to Augusta, other communities that participate in the project included Columbia County, the City of Waynesboro, the City of Lincolnton, and Thomson-McDuffie County.
- Completed Fecal Coliform TMDL Implementation Plans for Rocky Creek and Butler Creek. The plans identify regulatory and non-regulatory measures designed to reduce fecal coliform levels in these two creeks so that they meet the applicable water quality standards.
- Implementation of water and sewer system improvement projects. Bond-financed projects that will impact water quality and quantity include providing sewer service to unsewered areas, upgrading and expanding water and wastewater treatment facilities, upgrading existing wastewater interceptor lines, and infiltration/inflow reductions in the wastewater collection system.
- Implementation of a Stormwater Management Program and a Water Quality Monitoring Program in accordance with requirements of the Federal Clean Water Act. The Stormwater Management Program is designed to reduce non-

point source pollution. The objective of the Water Quality Monitoring Program is to monitor the health of local watersheds and develop procedures to maintain water quality.

- Developed and implemented a Community Greenspace Program in accordance with Sec. 36-22-1 et seq. of the Official Code of Georgia Annotated. Adopted by the Augusta Commission in November 2000, and updated in October 2002, the Greenspace Program is designed to preserve up to 20% of the city's land area as greenspace. Areas targeted for protection include lands along the Savannah River, within Phinizy Swamp, and adjacent to local creeks and streams.

8.4.1 Aquifer and Groundwater Recharge Areas

Aquifers are soils or rocks in which groundwater is stored. Aquifers vary widely in size and depth and are used for drinking water, irrigation, and manufacturing processes. Recharge is the process by which precipitation infiltrates soil and rock to add to the volume of water stored in aquifers. A recharge area is any portion of the earth's surface where water infiltrates into the ground to replenish an aquifer

The two major aquifers in Augusta-Richmond County are the Upper Cretaceous and Basal Cretaceous aquifers. The Upper Cretaceous aquifer is the shallower of the two reservoirs, and is not extensively developed. Most of the groundwater used in the city is pumped from the Basal Cretaceous aquifer. The recharge area for the Cretaceous aquifer covers the majority of Richmond County, and is classified as a significant groundwater recharge area by the Georgia Department of Natural Resources. According to DNR's Ground-Water Pollution Susceptibility Map of Georgia, Hydrologic Atlas 20, some of the recharge area has a high susceptibility to pollution and some has a medium susceptibility to pollution.

At the present time, groundwater availability in the aquifers is still good. However, DNR is concerned about the stress placed on the aquifers and has urged the city to pursue surface water as an alternative source of supply for drinking water. The city is in the process of making improvements to the water supply system that will reduce the reliance on groundwater sources (see discussion of water system in Community Facilities chapter). Pumping in the vicinity of Augusta Regional Airport has modified the natural west-to-east flow system of the aquifer. A cone of depression exists immediately west of the airport, and data indicates that the aquifer is also stressed in the vicinity of a nearby industrial complex. In the spring of 2001 the city had to discontinue pumping from four existing wells to compensate for new well fields that were brought on line off Old Waynesboro Road.

In October 1998 the Augusta Commission adopted a Groundwater Recharge Area Protection Ordinance in accordance with state environmental standards. The objectives of the ordinance are:

1. Protect groundwater quality by restricting land uses that generate, use or store dangerous pollutants in recharge areas;
2. Protect groundwater quality by limiting the density of development; and
3. Protect groundwater quality by ensuring that any development that occurs within the recharge area shall have no adverse effect on groundwater quality.

The ordinance established the Groundwater Recharge Area District that coincides with the Cretaceous aquifer recharge area. Within the district, no building permit, site plan or subdivision plan will be approved unless it is in compliance with the groundwater protection standards. The standards that apply throughout the district include the following:

- New hazardous waste treatment or disposal facilities are prohibited.
- New waste disposal facilities must have synthetic liners and leachate collection systems.
- New facilities involving the handling, storage and disposal of hazardous materials shall take place on an impermeable surface having an approved spill and leak collection system.
- New above-ground chemical or petroleum storage tanks larger than 660 gallons must have a secondary containment of 110% of the volume of the tank or 110% of the volume of the largest tank in a cluster of tanks.

Additional standards apply depending on whether the affected site within the district has a low, medium or high susceptibility to pollution. The requirements are as follows:

Recharge Areas with Low Susceptibility to Pollution

- New agricultural waste impoundment sites larger than 50 acre-feet must be lined.
- Any new home served by septic tank/drain field system must be approved by the Richmond County Health Department and must have a lot that is at least 110% of the minimum lot size required by Table MT-1 of the Department of Human Resource's Manual for On-site Sewage Management Systems.
- Any new manufactured home park served by a septic tank/drain field system must be approved by the Richmond County Health Department and must have a lot or space that is at least 110% of the minimum lot or space size required by Table MT-2 of the Department of Human Resource's Manual for On-Site Sewage Management Systems.

Recharge Areas with Medium Susceptibility to Pollution

- New agricultural waste impoundment sites larger than 15 acre-feet must be lined.
- Any new home served by septic tank/drain field system must be approved by the Richmond County Health Department and must have a lot that is at least

125% of the minimum lot size required by Table MT-1 of the Department of Human Resource's Manual for On-site Sewage Management Systems.

- A new manufactured home park served by a septic tank/drain field system must be approved by the Richmond County Health Department and must have a lot or space that is at least 125% of the minimum lot or space size required by Table MT-2 of the Department of Human Resource's Manual for On-Site Sewage Management Systems.

Recharge Areas with High Susceptibility to Pollution

- All new agricultural waste impoundment sites must be lined.
- Any new home served by septic tank/drain field system must be approved by the Richmond County Health Department and must have a lot that is at least 150% of the minimum lot size required by Table MT-1 of the Department of Human Resource's Manual for On-site Sewage Management Systems.
- Any new manufactured home park served by a septic tank/drain field system must be approved by the Richmond County Health Department and must have a lot or space that is at least 150% of the minimum lot or space size required by Table MT-2 of the Department of Human Resource's Manual for On-Site Sewage Management Systems.
- Spray irrigation of wastewater or the land spreading of wastewater sludges must be approved by DNR.
- Permanent storm water infiltration basins are prohibited.
- New wastewater treatment basins (except for mining settling basins) must have an impermeable liner and be approved by DNR.

To date, the primary impact of the Groundwater Recharge Ordinance has been on the minimum lot size for homes (stick-built or manufactured) with septic tanks and located in agricultural zones. Prior to enactment of the ordinance the minimum lot size for any new home served by a septic tank/drain field, and located in an Agricultural Zone, was 16,000 square feet (20,000 sq. ft. for a flagpole lot). The new minimum lot size requirements vary, depending on the soil type, slope of the lot, and level of pollution susceptibility, but the overall effect is that the minimum lot size has increased to an average of 37,500 square feet (.86 acre).

In addition to the Groundwater Recharge Area Protection Ordinance, Augusta continues to implement other projects to protect groundwater and recharge areas:

- Separation of remaining combined storm and sanitary sewer collection systems.
- Implementation of infiltration/inflow reductions in the sanitary sewer collection systems.
- Extending sanitary sewer service to unsewered subdivisions.
- Extending sanitary sewer service to growth areas.

8.4.2 Wetlands

Under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." (EPA Regulations at 40 CFR 230.3) Wetlands are important to both the environment and the economy. Wetlands provide a wide range of benefits that include habitat, support of commercial and recreational fisheries, reduction of flood damages, and abatement of water pollution.

In Richmond County wetlands are located adjacent to the Savannah River, the Augusta Canal, and the major creeks and tributaries that drain the county. The largest concentration of wetlands is found in the Phinizy Swamp, the large floodplain of the Savannah River located on the east side of the county. Local wetlands provide a habitat for native plants and animals, provide a place for migrating birds to rest and feed, absorb and slow floodwaters, and filter pollutants before they reach the Savannah River and other waterbodies. The Phinizy Swamp is being used to educate children and adults about the important functions of wetlands and the need to protect and preserve them.

The U. S. Environmental Protection Agency (EPA) estimates that more than half of the original wetlands in the continental United States have been drained and converted to other uses. Common human activities that degrade wetlands include hydrologic alterations, pollution inputs, and vegetation damage. Examples of hydrologic alterations include:

- Deposition of fill material for development.
- Drainage of development, farming and mosquito controls.
- Dredging and stream channelization for navigation, development and flood control.
- Diking and damming to form ponds and lakes.
- Diversion of flow to or from wetlands
- Addition of impervious surfaces in the watershed, thereby increasing water and pollutant runoff into wetlands.

Examples of pollutants that degrade wetlands include sediment, fertilizer, human sewage, animal waste, pesticides, and heavy metals. Wetland plants are susceptible to degradation from hydrological changes, pollution inputs, grazing by domestic animals, and the introduction of nonnative plants. Storms and droughts are examples of natural activities that can damage wetlands.

The city of Augusta, in cooperation with residents, developers, environmental organizations, educators, and others, participates in a variety of programs to protect wetlands and improve water quality. The types of active programs include the monitoring and assessment of water quality, permitting, TMDLs, and public outreach/education.

Monitoring/Assessment - Monitoring and assessment of water quality on local creeks was an integral part of the recently-completed Augusta Watershed Assessment. As part of the project, Parsons Engineering Science, Inc. and CSRA Laboratories installed eight (8) water quality monitoring stations throughout the county. At least one monitoring station was located on each of the major creeks. These stations monitor flow, temperature, rainfall and chemical composition of the creeks. Additionally, Parsons conducted biological monitoring within the creek watersheds. Assessment of the monitoring data pinpointed water quality issues in each of the creeks. The monitoring stations will remain and be used by the Augusta Utilities Department to track future changes in water quality.

Permitting - The City of Augusta participates in the major permitting programs of the Clean Water Act including the following:

> **Clean Water Act Section 404** - Section 404 establishes program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities that are regulated include fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. Augusta's land subdivision and site plan regulations require applicants to delineate affected wetlands on all submittals, and to provide evidence that a Section 404 permit has been issued by the U. S. Army Corps of Engineers, prior to approval of any development plan or site plan.
>
> **NPDES Permit** - As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Examples of regulated point sources include industrial and municipal wastewater treatment systems that discharge directly to surface waters. The city of Augusta participates in this program, which is administered at the state level by the Georgia DNR Environmental Protection Division (EPD). The City holds valid NPDES Permits for both the Messerly and Spirit Creek wastewater treatment plants.

Georgia EPD currently requires municipalities with population generally over 100,000 to obtain an NPDES permit to operate a Municipal Separate Storm Sewer System (MS4). Augusta has an MS4 permit for a program to reduce nonpoint source pollution and monitor water quality. In 2003 EPD will prepare a general permit under which Augusta and other communities will have to implement a stormwater management program. The MS4 permit mandates a minimum of six control measures:

- Public education and outreach
- Public participation/involvement

- Illicit discharge detection and elimination
- Construction site runoff
- Post-construction runoff control
- Pollution prevention/good housekeeping

The stormwater management program must be phased in over the initial 5-year permit period.

TMDLs - A TMDL or Total Maximum Daily Load is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. The state of Georgia has a court-mandated schedule for development of TMDLs that is the most aggressive in the country. Augusta has completed TMDL Implementation Plans for Rocky and Butler Creeks with the help of the CSRA Regional Development Center. The implementation plans identify regulatory and non-regulatory measures designed to reduce fecal coliform levels in the two creeks. Recently completed watershed assessments for Augusta and the Central Savannah River Basin provide additional strategies for watershed management to meet the anticipated TMDLs.

Public Outreach/Education - Recent watershed planning projects have afforded the city an opportunity to increase public outreach and education regarding water quality and protection. A website was established to keep the public informed about progress on the Augusta Watershed Assessment. A project newsletter was published that provided information on a wide variety of water related issues. An Enviroscope watershed model is used to teach children about how a watershed works. Enviroscope demonstrations have been conducted at area schools, the Phinizy Swamp Nature Park and Fort Discovery. In cooperation with the Southeastern Natural Sciences Academy, the city sponsors tours of its "constructed" wetlands project located within the Phinizy Swamp Nature Park. The wetland cells serve to reduce the nutrients in Augusta's wastewater using bacteria, plants and soils. The plants provide a place for the bacteria to break down the nutrients before the water is released into Butler Creek. As a follow-up to the Watershed Assessment, the city established the Watershed Roundtable, a committee charged with continuing water resource planning and developing public outreach initiatives. The Watershed Roundtable includes representatives from government, the private sector, non-profit organizations and environmental groups.

8.4.3 Water Supply Watersheds

The Georgia Department of Natural Resources (DNR) defines a water supply watershed as the area of land upstream of a governmentally owned public drinking water intake or water supply reservoir. DNR has established minimum criteria for the protection of drinking water watersheds. This protection is necessary for the enhancement of public health, safety and welfare, as well as to assure that surface sources of drinking water are of high quality in order to be treated to meet all State and Federal drinking water standards. Separate criteria have been established for large watersheds (100+ square

miles in the drainage basin) and small watersheds (<100 square miles in the drainage basin).

The removal of vegetation and the introduction of paving for roads, parking lots, driveways and other impervious services increase run-off on a site. This in turn increases erosion, flooding and sedimentation of water sources. The DNR criteria establish buffer zone requirements adjacent to perennial streams and specify allowable impervious surface densities adjacent to such streams. These requirements are designed to prevent intensive development of a water supply watershed from contaminating a water source to a point where it cannot be treated to meet drinking water standards.

Richmond County contains one large watershed and one small watershed. The Middle Savannah River Watershed is the large watershed. The City of Augusta's water supply comes from the Savannah River via the Augusta Canal. The Augusta Lock and Dam, located on the canal approximately 4 miles above the raw water pumping station, controls water flow into the canal.

The part of the Butler Creek Watershed above Butler Reservoir is the small watershed. The watershed is located in northwest Richmond County, and a portion of Columbia County, and covers approximately 15 square miles. The watershed drains to Butler Reservoir, which is the source of water for Fort Gordon. The Fort is permitted to withdraw 5.4 MGD from the reservoir. The watershed is characterized by low-density residential development, woodlands and scattered commercial uses. Since the opening of the Jimmie Dyess Parkway in 1998, urban development has increased in the watershed area. Other planned road improvement projects will no doubt increase development pressure.

Augusta currently has in place several ordinances and programs to protect water supply watersheds from pollution or alteration. This includes a group of land use and development ordinances, as well as an ordinance that applies to the large Middle Savannah River Watershed. A brief summary of the ordinances follows.

Water Supply Watershed Protection Ordinance – The purpose of this ordinance is to establish measures to protect the quality and quantity of the surface water supply for the city. It establishes a water supply watershed district covering an area within a seven (7) mile radius of the city's water supply intake on the Augusta Canal (Savannah River). Within the district, any new facilities that handle hazardous materials must perform their operations on impermeable surfaces having spill and leak collection systems. The Augusta Commission adopted the ordinance in October 1998 to comply with Georgia DNR's Part V environmental standards.

Soil Erosion and Sediment Control Ordinance – The purpose of this ordinance is to control soil erosion and sedimentation resulting from land-disturbing activity. The ordinance includes minimum requirements or best management practices (BMPs) for erosion and sedimentation control, and establishes a process for the review and approval

of Soil Erosion and Sediment Control Plans. The ordinance also includes enforcement and penalty provisions.

Tree Ordinance – This ordinance, first enacted in 1992, provides standards for the protection of trees located on public property, designates landmark trees, and establishes landscaping standards that apply to the development of private property. A Tree Commission is charged with reviewing and approving the Greenspace Plans submitted by private developers. Among other things, the ordinance is designed to prevent soil erosion, retard storm water runoff, and reduce the amount of impervious surfaces on development sites.

Other Ordinances and Regulations – Other ordinances and regulations that serve in part to protect water resources include the City's zoning ordinance, subdivision regulations, site plan regulations, grading ordinance, flood damage prevention ordinance, and stormwater management ordinance. Among other things, these ordinances and regulations limit the types of land uses allowed in an area, restrict the amount of impervious surface on a lot, require retention and detention facilities to control surface water runoff, and restrict development within floodplains.

8.4.4 River and Stream Corridors

Floodplains – As a body of water (e.g. river, stream, or creek) erodes and deposits material, it may shift its course and over a period of time build up a deposit of material in its valley bottom. This deposited material takes the shape of a plain, called a floodplain, which forms at elevations near that of the water's surface. About 25 percent of Richmond County (43,600 acres) is comprised of floodplains, stream terraces, and interstream divides. According to Flood Insurance Rates Maps / Flood Boundary and Floodway Maps published by the Federal Emergency Management Agency (FEMA), floodplains are located within and adjacent to the Savannah River and its tributaries (e.g. Rock, Rae's, Crane, Rocky, Butler, Spirit and McBean Creeks). The 100-year flood also referred to as the "base flood" is defined as the flood having a one percent probability of being equaled or exceeded in any given year.

Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The National Flood Insurance Program enables property owners in participating communities to purchase insurance protection against losses from flooding. The insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating cost of repairing damage to buildings and their contents caused by floods. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. The program is administered by the Federal Insurance Administration, a division of the Federal Emergency Management Agency (FEMA).

Participation in the NFIP is based on an agreement between local communities and the federal government. Basically, if a community adopts and enforces measures to reduce future flood risks to new construction in special flood hazard areas, the federal

government makes flood insurance available within the community as a financial protection against flood losses which do occur.

Augusta has participated in the NFIP for approximately 30 years. The city also has Flood Damage Prevention Ordinance that is based on FEMA's model ordinance. The ordinance requires anyone who wants to grade, fill, erect a structure, or otherwise develop in a floodplain to obtain a permit before starting any land disturbance or construction. The ordinance includes specific standards for development in floodplains and requires the filing of an Elevation Certificate before the city issues a certificate of occupancy. A group of maps delineate the applicable areas in the city susceptible to flooding during the 100-year and 500-year design floods. The maps are the basis for determining the areas regulated by the Flood Damage Prevention Ordinance.

The flood ordinance is amended on occasion to conform to new federal regulations, to correct deficiencies, and to address new issues. Areawide flooding caused by tropical downpours in October 1990 is one event that triggered ordinance revisions in recent years. Some of the recent ordinance amendments include:

- Separating the floodway fringe into two areas, the upper floodway fringe and the lower floodway fringe. No encroachments, structures, or fill are permitted in the lower floodway fringe unless an engineer certifies that the encroachments will not trigger a rise in the base flood elevation.
- Manufacture homes must meet all the requirements for new construction, including elevation and anchoring.
- New construction or substantial improvement of any structure or manufactured home located in a Special Flood Hazard Area shall have the lowest floor elevated at least three (3) feet above the base flood elevation.

The city has also developed a Flood Hazard Mitigation Plan. The purpose of the Flood Hazard Mitigation Plan is to assess flood risks and to articulate a comprehensive strategy for implementing flood mitigation activities. The plan outlines the risks associated with flooding, describes the existing conditions in Augusta, describes existing mitigation programs and activities, and presents a list of recommended mitigation strategies and activities.

Having a Flood Hazard Mitigation Plan makes the city eligible to apply for Flood Mitigation Assistance (FMA) Grants from FEMA. FMA project grants are an integral part of the city's strategy to purchase property with a history of repeat damage from floods. Since 2000, the city has purchased a total of 12 homes in the vicinity of Rae's and Rocky Creeks. FMA grants have funded 75 percent of the cost of the buyouts, with state (15%) and local (10%) government funds accounting for the rest. The Augusta Emergency Management Agency is also developing a data base of additional properties with repetitive flood losses. The data base will be used to target additional properties for acquisition, and to identify flooding problems that can be corrected by local storm drainage improvements.

8.4.5 Protected River Corridor

The Savannah River is a protected river under the Georgia Mountain and River Corridor Protection Act. The Savannah River is a unique resource and has played a central role in the history and development of Augusta and surrounding communities. At Augusta the river rolls over the fall line separating the Piedmont and Coastal Plain physiographic provinces. The river supports a variety of plants, animals and wildlife and enhances the quality of life for residents.

Floodways, floodplains and wetlands are the predominant land uses along the Savannah River. The shallow waters at the fall line expose several small islands in the river just upstream from downtown Augusta. Other land uses within the river corridor include part of a stone quarry, part of the Augusta Canal, the Augusta Waterworks pumping station, part of the Savannah River levee, and some single-family residences.

In 1994 the city adopted a River Corridor Protection Plan as an amendment to the Comprehensive Plan. The Protection Plan includes an overview of the river corridor, an assessment of corridor protection measures and an implementation strategy. In 1998 the city amended the zoning ordinance by establishing the Savannah River Corridor Protection District. The river corridor protection district extends 100 feet horizontally from the river bank. The existing natural vegetative buffer must be maintained within the district and new land uses are limited to single-family residences (minimum 2-acre lot), agricultural and timber production, wildlife and fisheries management, recreational uses, and some other public facilities and utilities. Handling, receiving, storage and disposal of hazardous wastes are prohibited in the district.

8.5 Greenspace Program

In November 2000 the city of Augusta adopted a Community Greenspace Program in accordance with regulations in the Official Code of Georgia Annotated, Section 36-22-2 et seq. The city's Greenspace Program was updated in the fall of 2002. The goal of the program is to permanently preserve twenty percent (20%) of Augusta's land area as greenspace. The Greenspace Program identifies areas for protection, including lands along the Savannah River, within Phinizy Swamp, and along the major creeks (Butler, Rae's, Rock, Rocky, Spirit and McBean). It lists the tools to preserve greenspace, including fee simple acquisition, conservation easement acquisition, restrictive covenants, and negotiated or privately-initiated easements or covenants. There are also a number of local ordinances that protect lands along the river and creeks.

The Greenspace Program serves as the basis for the expenditure of funds (local, donated, grants from the Georgia Greenspace Commission) for greenspace protection. To date the local Greenspace program has received $1,113,013 in grant funds for the Georgia Greenspace Commission (FY 2001 and FY 2002 funds combined). Some of these funds have been used to permanently protect 649 acres of land along the Savannah River and parts of Butler and Spirit Creeks.

The objective of the program is to permanently protect land along the Savannah River and all major creeks in the county. Greenspace along the river will include multi-use trails along the Augusta Canal and the river levee from Columbia County to the New Savannah Bluff Lock and Dam Recreational Area and the Phinizy Swamp Nature Park, both located south of downtown. The Butler Creek Greenway will extend for nine miles along the creek from north of Deans Bridge Road to New Savannah Bluff. Connections to greenspace areas in Columbia County and North Augusta, South Carolina are envisioned as part of the trail network. In addition, local funds are being used by the Central Savannah River Land Trust to market the program and to conduct negotiations with property owners.

The Augusta-Richmond County Planning Commission and the Central Savannah River Land Trust jointly administer the Greenspace Program on behalf of the city. The Land Trust is a non-profit organization capable of accepting donations of land and conservation easements designed to permanently protect sensitive environmental resources. A broad-based group of citizens and organizations are involved in the Greenspace program. Among them are the Southeastern Natural Sciences Academy, the Augusta Canal Authority, Augusta Metro Chamber of Commerce, Sierra Club, the Nature Conservancy, the Builders Association of Metro Augusta, Savannah Riverkeeper, the Georgia Forestry Commission, and several neighborhood organizations.

8.6 Summary and Needs Assessment

Augusta is blessed with natural resources that contribute to progress and enhance the quality of life in the community. The local climate, soils, air quality, water resources, plant and animal habitat, forests and park and recreation areas serve as attractors for new development. As urban development continues it is important to protect natural resources and enlist public support and participation in protection measures.

Fortunately, environmental stewardship is a goal of many in the community, not just the local government. Educators and non-profit organizations teach children and adults about how the natural environment works and methods to protect natural resources. Hands-on activities and experiences are available at facilities such as the Phinizy Swamp Nature Park and the Spirit Creek Educational Forest. Business and industry support the work of environmental organizations, participate in programs related to air and water quality assessment, and comply with applicable environmental regulations in their own operations. Stakeholders as diverse as farmers, hunters, bird watchers, and environmental engineers are working together to protect our natural resources.

This chapter provided an overview of natural resources in Augusta and the steps being taken by the local government to protect them. Examples of local government measures include the monitoring and assessment of some resources, planning for long-term protection, enforcement of ordinances and regulations, public outreach and education, and capital improvements. These and other initiatives have improved the condition of some resources and heightened community awareness of the continuing threats to the natural environment. Still, much remains to be done to correct past mistakes and assure a

better future for our remaining natural resources. The city of Augusta intends to continue the following natural resource protection activities.

Administer and Enforce Ordinances - The City will continue to administer and enforce the natural resource protection ordinances outlined in this chapter. The city will amend the ordinances as necessary and respond with new ordinances if the need arises. In the near term, water supply watershed protection is needed in the Butler Creek watershed above Butler Reservoir.

Implementation of Best Management Practices - The City will implement structural and non-structural BMPs in order to protect water resources and limit the effect of point and non-point sources of pollution. This includes such initiatives as making improvements to the water and sewer systems, adopting appropriate stormwater management guidelines, and establishing a long-term surface water-monitoring program.

Public Outreach / Education - The City will work with stakeholders to develop solutions to environmental problems and to foster the sharing of information related to environmental quality and protection. The recently formed Watershed Rountable is one example of the city's public outreach efforts.

Expand Community Greenspace Program - The City will build on the initial success of the Community Greenspace program. The city will aggressively pursue the protection of additional lands through fee simple acquisition, purchase of easements, restrictive covenants and donation of land. The city will also take steps to reduce or eliminate the barriers to achieving greenspace protection, as detailed in the Community Greenspace Program.